Cytodites nudus-induced granulomatous pneumonia in chickens

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The air sac mite, *Cytodites nudus*, has been reported in chickens, turkeys, pheasants, ruffed grouse (1-6), pigeons (7), and canaries (8) from many parts of the world. These mites, which measure 0.4 mm × 0.5 mm, appear grossly as small white spots on the air sacs, and have also been found within bronchi, lungs, and bone cavities (1,2,4-6). Their life cycle is unknown (1,4).

Light infestations with this parasite are reported to be well tolerated by chickens; however, large numbers of mites will enter the lungs where they are capable of causing granulomatous pneumonia (1,4,5,9). Respiratory disease of chickens, caused by this mite, has been reported more frequently in free-ranging flocks (4) than in intensively raised birds.

The occurrence of *C. nudus* in birds in Canada has been documented (3), but disease caused by this parasite in poultry has not been described in the Canadian literature. We report granulomatous pneumonia due to *C. nudus* in a free-ranging poultry flock, and stress parasitological and histopathological examination for definitive diagnosis.

In September of 1990, four, one to two year old Greyline Barred Rock cross chickens from northeastern British Columbia were submitted to the Peace River Regional Veterinary Laboratory for necropsy. These birds were from a flock consisting of 24 adults and 45 five-month-old pullets that had been acquired from various sources. All chickens had access to an outside run and to an insulated 3 m × 4 m building that was poorly ventilated. Straw and sawdust were used as bedding.

Clinical signs in the older birds, as described by the owner, included intermittent sneezing, head shaking, and occasional diarrhea. Several birds developed blue combs and eventually died. Clinical signs of respiratory disease had subsided with antibiotic therapy, but recurred when treatment was discontinued.

Tissues were fixed in 10% neutral buffered formalin, embedded in paraffin, sectioned at 5 μ, and stained with hematoxylin and eosin. Mites, obtained from fresh birds, were fixed in alcohol-formalin acetic acid and permanently mounted using Hoyer's medium. Formalin-fixed lung was gently teased apart under a dissecting microscope at 40× magnification, and the mites that were recovered were processed as above.

All birds submitted had been killed by cervical dislocation by the owner. They were in very good body condition. In two birds, the trachea and the lungs were moderately congested. In three birds, several white parasites, measuring 0.5 mm × 0.4 mm, were present on otherwise grossly normal abdominal and clavicular air sacs. In all chickens, the unfeathered portion of the skin of the legs was severely thickened and hyperkeratotic. The ovary and oviduct of one bird was markedly distended and contained copious amounts of caseous material. The gastrointestinal tracts contained moderate amounts of normal ingesta.

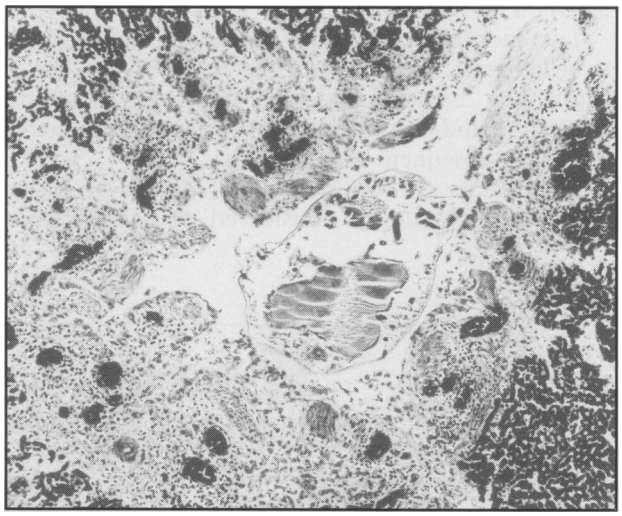

Figure 1. Section of chicken lung which contains a free *Cytodites nudus* mite within a tertiary bronchus. H&E.

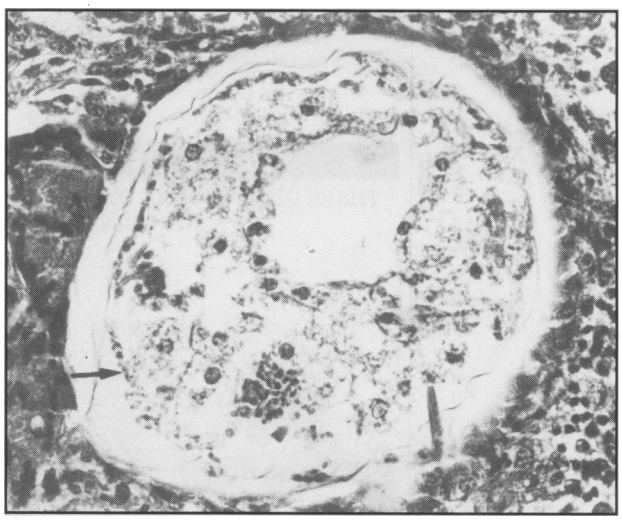

Figure 2. Photomicrograph of a chicken lung with granulomatous inflammatory reaction surrounding a *Cytodites nudus* mite (arrow). H&E.

Microscopically, the lungs of three birds were congested, and many tertiary bronchi and atria contained intraluminal fibrinous or mucinous material. Numerous mites were free within the lumens of tertiary bronchi or, less frequently, the atria (Figure 1). Lymphocytes, multinucleated giant cells, and a few heterophils, as well as basophilic birefringent mineral, were present around dead and degenerate mites (Figure 2). There were numerous prominent lymphocytic nodules and mild bronchiolar muscular hypertrophy in many portions of lung. Mucinous material was adherent to the tracheal mucosa in three birds.

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There were no visible lesions in sections of liver, spleen, kidney, heart, and intestine.

Mites obtained from the air sacs of fresh birds, as well as those from formalin-fixed lung, were identified as *C. nudus* according to the criteria described by Fain (10) (Figure 3). *Knemidokoptes mutans* were identified in large numbers within the skin of the lower limbs.

Light growths of mixed bacterial contaminants were isolated from liver and lung of all birds. In one bird, coliforms were cultured from the oviduct. No acid-fast organisms were detected within pulmonary granulomas with the use of the Ziehl-Neelsen stain.

Cytodites nudus infestations have been reported infrequently in chickens. This report is the first description of the lesions of granulomatous pneumonia due to *C. nudus* in chickens in Canada. The rarity of these parasites, as well as their small size, may preclude a diagnosis of mite-induced pneumonia unless close attention is paid to the lungs and air sacs.

Cytodites nudus are capable of entering the lungs from the air sacs. Lesions in the chickens examined were similar to those described by others (1,2,4,5). In our opinion, the pneumonia in these birds was severe enough to have accounted for respiratory distress. Infestation of chickens with *C. nudus* has caused mortality in some flocks (4,5). Death losses were not evaluated in our case, as only euthanized birds were presented for postmortem evaluation. The effects of *C. nudus* infestation on flock mortality and egg or meat production have not been evaluated.

Little is known about the life cycle of *C. nudus*. Some have speculated that eggs are laid in the lower air passages, coughed up, swallowed, and subsequently passed in droppings (1). Both male and female parasites were present within the air sacs of the birds examined; however, no forms suggestive of immature parasites or eggs were seen grossly or histologically. Excreta and bedding were not examined for the presence of parasites.

Air sac mite infestations in chickens have been reported with concurrent *Mycobacterium* spp. infections (2); however, there was no evidence of tuberculosis in these birds. Mite-induced granulomatous pneumonia was not present in two untreated pullets submitted for follow-up examination. *Cytodites nudus* infestations may be more common in birds greater than one year of age. This, coupled with the free ranging management practices associated with affected birds, may explain the association of *C. nudus* infestation with avian tuberculosis noted by some.

No recommended treatment protocol is available for chickens infested with *C. nudus*. McOrist (4) described successful clinical response using a malathion aerosol. Following a diagnosis of parasitic pneumonia in the case reported herein, the owner proceeded to treat six birds intramuscularly with 0.16 mg/kg of ivermectin (Ivomec, MSD/Agvet, Kirkland, Quebec). Postmortem examination of these birds, submitted for follow-up examination eight weeks posttreatment, revealed the presence of mites in the lung and granulomatous pneumonia; however, *C. nudus* were not visible within the air sacs. The effectiveness of this treatment regime cannot be evaluated from these observations.

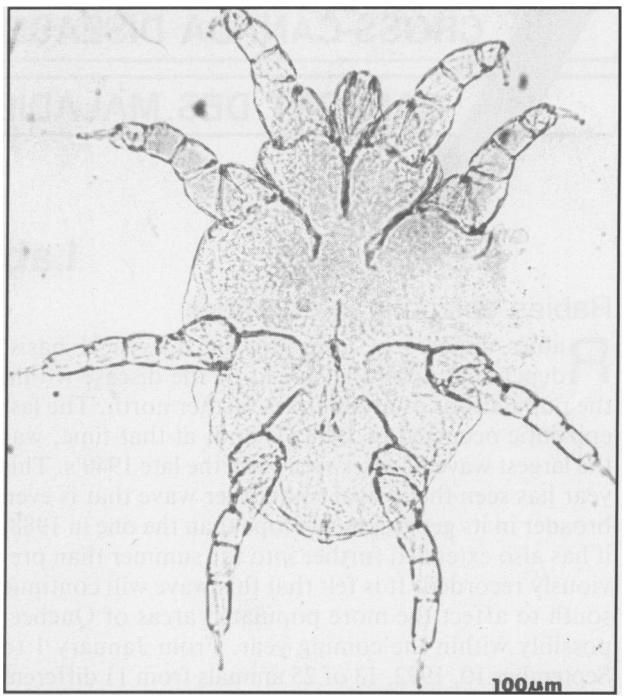

Figure 3. Photomicrograph of a female *Cytodites nudus* mite recovered from the air sac of an infested chicken.

Granulomatous pneumonia due to infestation with *C. nudus* must be considered in the differential diagnosis of respiratory disease of free-ranging poultry flocks. Definitive diagnosis of this condition is based on demonstration of mites during postmortem examination of affected birds.

Footnote

Representative specimens of *C. nudus* recovered from the air sacs of these chickens have been deposited in the National Museum of Natural Sciences Invertebrate Collection (parasites). Invertebrate Zoology Division, Ottawa, Ontario, Canada. Accession #CMNP 1991 - 0001. CVJ

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